

CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1                   1.    An apparatus for detecting a seal on a film,  
2                   comprising;  
3                   a force transmitter, disposed to transmit a  
4                   force from the film;  
5                   a force sensor disposed to receive the  
6                   transmitted force and provide a force signal in  
7                   response thereto; and  
8                   a controller, disposed to receive the force  
9                   signal and provide a seal signal in response thereto.

10  
11                   2.    The apparatus of claim 1, wherein the force  
12                   sensor is an acoustic sensor.

13  
14                   3.    The apparatus of claim 1, wherein the force  
15                   sensor is a mechanical sensor.

16  
17                   4.    The apparatus of claim 1, wherein the force  
18                   sensor is a vibration sensor.

19  
20                   5.    The apparatus of claim 1, further comprising  
21                   an anvil disposed on a first side of a film path, wherein  
22                   the force transmitter is disposed on a second side of the  
23                   film path.

24  
25                   5.    The apparatus of claim 1, wherein the force  
26                   sensor is a piezoelectric sensor.

27  
28                   6.    The apparatus of claim 5, wherein the force  
29                   transmitter is a quill disposed near a path of the film.

3 7. The apparatus of claim 6, wherein the quill  
4 is rigid.

1 8. The apparatus of claim 7, wherein the quill  
2 is comprised of stainless steel.

1 9. The apparatus of claim 6, wherein the quill  
2 is angled in a downstream film path direction, relative to  
3 normal to the film path.

1 11. The apparatus of claim 10, wherein the quill  
2 includes a radius surface abutting the film path, and the  
3 quill is held against the film path by a spring force.

1 11. The apparatus of claim 5, wherein the  
2 controller includes an amplitude comparator that receives  
3 the force signal and an amplitude threshold.

1 13. The apparatus of claim 5, wherein the  
2 controller includes a rise-time comparator that receives the  
3 force signal and a rise-time threshold.

1 14. The apparatus of claim 1, wherein the  
2 controller includes a window circuit.

1 15. A method for detecting a seal on a film,  
2 comprising;  
3 providing a force signal responsive to the  
4 seal; and  
5 detecting the force and providing a seal  
6 signal in response thereto.

1 16. The method of claim 15, further comprising  
2 transmitting a force from the film.

3 17. The method of claim 15, wherein providing the  
4 force signal includes detecting an acoustic signal.

1 18. The method of claim 16, wherein providing the  
2 force signal includes detecting a mechanical signal.

1 19. The method of claim 16, wherein providing a  
2 force signal includes sensing a vibration.

1 20. The method of claim 15, further comprising  
2 transmitting the force with a quill disposed near a path of  
3 the film.

21. The method of claim 15, wherein providing a  
seal signal includes comparing an amplitude of the force  
with a threshold.

22. The method of claim 21, wherein providing a  
seal signal includes making the comparison during a window.

23. The method of claim 22, wherein providing a  
seal signal includes comparing a rise-time of the force with  
a threshold.

1 24. An apparatus for detecting a seal on a film,  
2 comprising;  
3 means for providing a force signal in  
4 response to the seal;  
5 means for detecting the force signal, coupled  
6 to the means for providing a force signal; and  
7 means for providing a seal signal in response  
8 to the force signal, coupled to the means for  
9 detecting.

1 25. The apparatus of claim 24, further comprising  
2 means for transmitting a force from the film to the means  
3 for detecting, coupled to the means for detecting.

1 26. The apparatus of claim 25, wherein the means  
2 for detecting includes means for detecting an acoustic  
3 signal.

1 27. The apparatus of claim 25, wherein the means  
2 for detecting includes means for detecting a mechanical  
3 signal.

1 28. The apparatus of claim 25, wherein the means  
2 for detecting includes means for detecting a vibration  
3 signal.

1 29. The apparatus of claim 25, wherein the means  
2 for providing a seal signal includes means for comparing an  
3 amplitude of the force with a threshold.

1 30. The apparatus of claim 29, wherein the means  
2 for providing a seal signal includes means for making the  
3 comparison during a window.

1 31. The apparatus of claim 30, wherein the means  
2 for providing a seal signal includes means for comparing a  
3 rise-time of the force with a threshold.

1 32. A bag machine, comprising;  
2 a force transmitter, disposed to transmit a  
3 force responsive to a seal;  
4 a force sensor disposed to receive the  
5 transmitted force and provide a force signal in  
6 response thereto;

3

7 at least one upstream processing device,  
8 located upstream of the force transmitter;  
9 at least one downstream processing device,  
10 located downstream of the force transmitter; and  
11 a controller, disposed to receive the force  
12 signal and provide a seal signal in response thereto.

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1 33. The apparatus of claim 32, wherein the force  
2 sensor is a mechanical sensor.

1 34. The apparatus of claim 32, further comprising  
2 an anvil disposed on a first side of a film path, wherein  
3 the force transmitter is disposed on a second side of the  
4 film path.

5 35. The apparatus of claim 34, wherein the force  
6 sensor is a piezoelectric sensor.

1 36. The apparatus of claim 35, wherein the force  
2 transmitter is a quill disposed near a path of the film.

3 37. The apparatus of claim 36, wherein the quill  
4 is angled downstream.

1 38. The apparatus of claim 37, wherein the quill  
2 includes a radius surface abutting the film path, and the  
3 quill is held against the film path by a spring force.

1 39. The apparatus of claim 38, wherein the  
2 controller includes a window circuit.

1 40. The apparatus of claim 32, wherein one of the  
2 at least one downstream devices is registered to the seal.

1 41. The apparatus of claim 40, wherein one of the  
2 at least one downstream devices includes a knife.

1 42. The apparatus of claim 40, wherein one of the  
2 at least one downstream devices and the force transmitter  
3 are in a common tension zone.

1 43. A method for processing a bag, comprising;  
2 transporting the film from a first processing  
3 device to a seal sensing location;  
4 providing a force signal responsive to the  
5 seal at the seal sensing location;  
6 detecting the force and providing a seal  
7 signal in response thereto;  
8 transporting the film to a second processing  
9 device.

1 44. The method of claim 43, further comprising  
2 transmitting a force from the film.

1 45. The method of claim 44, wherein providing the  
2 force signal includes detecting a mechanical signal.

1 46. The method of claim 43, wherein providing a  
2 seal signal includes comparing an amplitude of the force  
3 with a threshold.

1 47. The method of claim 46, wherein providing a  
2 seal signal includes making the comparison during a window.

1 48. The method of claim 43, wherein providing a  
2 seal signal includes comparing a rise-time of the force with  
3 a threshold.